

## MICROWAVE FIELD EFFECT TRANSISTOR WITH HIGH OPERATING VOLTAGE AND METHOD OF FORMATION

### Abstract of the Disclosure

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A microwave field effect transistor (10) has a high conductivity gate (44) overlying a double heterojunction structure (14, 18, 22) that has an undoped channel layer (18). The heterojunction structure overlies a substrate (12). A recess layer that is a not intentionally doped (NID) layer (24) overlies the heterojunction structure and is formed with a predetermined thickness that minimizes impact ionization effects at an interface of a drain contact of source/drain ohmic contacts (30) and permits significantly higher voltage operation than previous step gate transistors. Another recess layer (26) is used to define a gate dimension. A Schottky gate opening (42) is formed within a step gate opening (40) to create a step gate structure. A channel layer (18) material of  $\text{In}_x\text{Ga}_{1-x}\text{As}$  is used to provide a region of electron confinement with improved transport characteristics that result in higher frequency of operation, higher power density and improved power-added efficiency.